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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/534,312	<b>Applicant(s)</b> MALCOLM, PETER BRYAN
	<b>Examiner</b> SON T. HOANG	<b>Art Unit</b> 2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 14 October 2008.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-77 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-77 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 14 October 2008 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | Paper No(s)/Mail Date: _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-146/08)<br>Paper No(s)/Mail Date <u>14 October 2008</u> | 5) <input type="checkbox"/> Notice of Informal Patent Application |
|   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Amendment*

1. This communication is in response to the amendment filed on October 14, 2008.

The abstract and drawings have been amended.

**Claims 1-3, 5-31, and 33-77** have been amended.

**Claims 78-80** have been canceled.

**Claims 1-77** are pending in this instant Office action.

### *Response to Arguments*

2. Applicant's sole argument towards **claims 1, 28-29, 52, 54, and 77** regarding the fact that Clifton does not teach or disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file.

The Examiner concurs with the above remarks. However, it is noted that Crocitti (*Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti*) cures the deficiencies of Clifton. Accordingly, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*)).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

In view of the above, the Examiner contends that all limitations as recited in the claims have been addressed in this instant Office action. Hence, Applicant's arguments do not distinguish over the claimed invention over the prior art of record.

For the above reasons, the Examiner believed that rejections of this instant Office action is proper.

***Information Disclosure Statement***

3. As required by **M.P.E.P. 609(C)**, the Applicant's submission of the Information Disclosure Statement dated 14 October 2008 is acknowledged by the Examiner. The cited reference has been considered in the examination of the claims now pending. As required by **M.P.E.P 609 C(2)**, a copy of the PTOL-1449 initialed and dated by the Examiner is attached to the instant Office action.

***Claim Objections***

4. **Claim 32** is objected to because of the following informalities: the status of the claim is "Currently Amended" whilst there is no amendment made to this claim. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-2, 4, 6-10, 12, 18-25, 28-30, 32, 34-38, 40, 45-49, 52-55, 57, 59-60, 65, 70-74, and 77** are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. (Pat. No. US 4,310,883, published on January 12, 1982; hereinafter Clifton), in view of Crocitti (Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti).

Regarding **claim 1**, Clifton clearly shows and discloses a method of operating a data processing system, the system comprising one or more application programs requiring persistent data storage for data files of application data, a plurality of storage devices each accessible via a computer network to one or more computers executing the application programs, and a broker program (*Abstract and Figure 8*), wherein the method comprises:

receiving, by means of the broker program, a request for storage of a data file of application data (*The first process or method step shown in the first block is to request a volume selection for storing the data set that requires a storage space. This request can be made by the primary host CPU 20 of the figures. The volume records for the volume group is then searched for all of the volumes that are eligible for storing the data set, [Column 22, Lines 59-64]*), and

selecting for the data file which of the plurality of storage devices will be used to store the data file in accordance with the characteristics of the application data to be stored, including the expiry date, and the state of the plurality of storage devices (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored*, [Column 17, Lines 13-18]).

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service*, [0027] and [0072]), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider*, [0048]).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claim 28**, Clifton clearly shows and discloses a method of operating a data processing system to store data (*Abstract and Figure 8*), comprising:

receiving a request from an application program, among one or more application programs, for storage of a data file of application data (*The first process or method step shown in the first block is to request a volume selection for storing the data set that requires a storage space. This request can be made by the primary host CPU 20 of the figures. The volume records for the volume group is then searched for all of the volumes that are eligible for storing the data set, [Column 22, Lines 59-64]*);

determining one or more characteristics of the application data file, including an expiry date (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]*));

monitoring the status of storage devices in a plurality of storage devices (*A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]*); and

selecting a storage device from the plurality of storage devices to store a data file of application data in accordance with the characteristics of the application data to be stored, including the expiry date, and the state of the plurality of storage devices (*The*

*access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18];*

*wherein the data file is stored on the selected storage device (The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]).*

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service

applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claim 29**, Clifton clearly shows and discloses a system for storing data comprising:

a plurality of storage devices (*Figure 9 shows a mass storage system of Figure 3 for selecting a volume, [Column 7, Lines 4-6]*);

a processor in communication with the plurality of storage devices, wherein the processor (*Figure 1 a mass storage system of the single address field dual-level type connected to central processing unit, [Column 6, Lines 52-54]*):

receives requests for storage of a data file of application data from one or more application programs requiring persistent data storage (*Specific factors are taken into consideration once a virtual storage space is found to be eligible for consideration by the request. The factors are weighed as to their relative importance in the selection process. The selected volumes are then sorted to order the virtual volumes selected from best choice to worst choice, [Column 4, Line 64 → Column 5, Line 4]*),

selects which of the plurality of storage devices will be used to store the data file in dependence on the characteristics of the data file to be stored, including the expiry date, and the state of the storage devices, such that the data file is stored in the selected storage device (*Figures 1 & 3 shows the mass storage volume controller 22 also maintains the uses tables to control the activity of the storage area. One such table is a mass storage volume inventory table 28 (see Figure 3) which contains the group*

*and volume records signifying the characteristics of the volume in the cartridge store 8, [Column 9, Line 65 → Column 7, Line 2]). The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]).*

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claim 52**, Clifton clearly shows and discloses a system for storing data (*Figures 1 & 3*), comprising:

one or more application programs requiring persistent data storage for data files of application data (*Figure 9 shows a mass storage system of Figure 3 for selecting a volume, [Column 7, Lines 4-6]*);

a plurality of storage devices each accessible via a computer network to one or more computers executing the application programs (*Figure 1 a mass storage system of the single address field dual-level type connected to central processing unit, [Column 6, Lines 52-54]*); and

a broker program for receiving a request from an application program for storage of a data file of application data; and to select for the data file which of the plurality of storage devices will be used to store the data file in accordance with the characteristics of the data file, including the expiry date to be stored and the state of the plurality of storage devices (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]*).

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claim 54**, Clifton clearly shows and discloses a computer program product for controlling a computer in a data storage system, the computer being operable to receive requests from one or more application programs, running on one or more computers, and requiring persistent data storage for data files of application data, and operable to monitor a plurality of storage devices (*Figures 1 & 3*), the computer program product comprising:

a recording medium readable by the computer, having program code stored thereon which when executed on the computer (*Figure 1*) configures the computer to perform the steps of:

receive a request for storage of a data file of application data from an application program (*The first process or method step shown in the first block is to request a volume selection for storing the data set that requires a storage space. This request can be made by the primary host CPU 20 of the figures. The volume records for the volume group is then searched for all of the volumes that are eligible for storing the data set, [Column 22, Lines 59-64]*), and

select for the data file which of the plurality of storage devices will be used to store the data file in accordance with the characteristics of the data file to be stored, including the expiry date, and the state of the storage devices (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]*).

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date

for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*]).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claim 77**, Clifton clearly shows and discloses a computer program product for controlling a computer in a data storage system, the computer program product comprising a recording medium readable by the computer, having program code stored thereon which when executed on the computer configures the computer (*Figures 1 & 3*) to perform the steps of:

*receiving a request from an application program, among one or more application programs, for storage of a data file of application data (*The first process or method step shown in the first block is to request a volume selection for storing the data set that requires a storage space. This request can be made by the primary host CPU 20 of the figures. The volume records for the volume group is then searched for all of the volumes that are eligible for storing the data set, [Column 22, Lines 59-64]*);*

*determining one or more characteristics of the application data, including the expiry date; (*A volume is chosen for which the volume expiration date is equal to or**

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*exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]);*

monitoring the status of storage devices in a plurality of storage devices (*A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]);*

selecting a storage device from the plurality of storage devices to store a data file of application data in accordance with the characteristics of the data to be stored including the expiry date, and the state of the storage devices (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]);*

wherein the data file is stored on the selected storage device (*The access to the volume selected for the data set to be stored is to a volume with sufficient free space (excluding reserved space) to allocate the data set in question. A volume is chosen for which the volume expiration date is equal to or exceeds, but is closest to, the expiration date of the data set to be stored, [Column 17, Lines 13-18]).*

Clifton does not disclose the request for data storage is received from the application program itself, and the request is in respect of a 'data file' of application data, and specified an expiry date for the data file

However, Crocitti teaches the request for data storage is received from an application program in respect of a data file of application data (*a storage request is issued by a service provider for storing information items corresponding to a distinct application of the same service, [0027] and [0072]*), and the request sets an expiry date for the data file (*the constraint or the information item relating to the date of expiry or the duration of validity is provided by the service provider, [0048]*).

It would have been obvious to an ordinary person skilled in the art at the time of the invention to incorporate the teachings of Crocitti with the teachings of Clifton for the purpose of providing an automatic memory management system for interactive service applications to improve access to the information stored and/or to free some available space for storage ([0004] of Crocitti).

Regarding **claims 2, 30, and 55**, Clifton further discloses monitoring, by means of the broker program, the remaining storage space available on each of the storage devices, to distinguish between in-use storage devices which have had data files written to them and empty storage devices which have not (*Volume groups can be assigned the attribute value of release/no release. After data set allocation, unused allocated space is released in cylinder quantities if the data set is not empty*, [Column 13, Lines 46-49]).

Regarding **claims 4, 32, and 57**, Clifton further discloses:

monitoring how much data is waiting to be written to each storage device, to detect an overload condition in the process of writing the data (*There exists certain*

*instances where a volume may not be a very good candidate for the current request because there is a previous request using or waiting in the queue to use the volume in an exclusive fashion. These volumes are called job wait volumes. The selection of this volume will cause this request to wait for the conflicting request to be completed. If the WAIT flag is activated, this signifies that the volume is selected for a request that would cause this request to wait because the volume was not completely ready for selection, [Column 29, Lines 13-22]); and*

*selecting, if an overload condition is detected for a storage device selected for storage, a different storage device for storage (From the volumes remaining, an attempt will be made to select a volume that is not a job wait volume. If any volumes exist that are not a job wait volume, then one of these volumes will be selected, [Column 29, Lines 60-64]).*

Regarding **claims 6, 34, and 59**, Clifton further discloses:

*storing, for each storage device, the latest expiry date of data files stored on that device, or of data files that are to be stored (A volume expiration date is calculated the first time a volume is selected to contain a data set after the volume is in a retention group. The volume expiration date is the date of the allocation plus a retention period, [Column 13, Lines 63-67]); and*

*permitting application data to be stored on a storage device if its expiry date is within a predetermined range of the latest expiry date (each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for*

*the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38];*

such that application data with similar expiry dates can be stored together and when such similar expiry dates have passed the storage device can be erased and re-used (*When the volume expires, all data sets residing on that volume may be destroyed. The expiration date of the volume can be nullified and that volume is now ready for reuse, [Column 14, Lines 2-5]*).

Regarding **claims 7, 35, and 60**, Clifton further discloses selecting another storage device for storage, if the expiry date of the application data is outside of the predetermined range of the latest expiry date (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]*).

Regarding **claims 8, and 36**, Clifton further discloses storing for each of the storage devices a target expiry date, and selecting which of the storage devices to use in dependence on a comparison of the expiry date and the target expiry date (*each*

*volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]).*

Regarding **claims 9, and 37**, Clifton further discloses preventing application data from being stored on a storage device, if the target expiry date for that storage device is earlier than the expiry date (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]).*

Regarding **claims 10, and 38**, Clifton further discloses preventing application data from being stored on a storage device if the target expiry date for that storage device is earlier than the expiry date by more than a predetermined margin (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The*

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*comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]).*

Regarding **claims 12, 40, and 65**, Clifton further discloses after the latest expiry date has passed, erasing the contents of the storage device (*The volume expiration date is the date of the allocation plus a retention period. Nonspecific data set allocations will not allocate a data set to a volume if the expiration of the data set date exceeds that of a volume. When the volume expires, all data sets residing on that volume may be destroyed, [Column 13, Line 63 – Column 14, Line 3]*).

Regarding **claims 18, 45, and 70**, Clifton further discloses notifying the application program of the storage device used to store the data file as determined by the broker program, such that the application program can store means to identify the device (*The best volume selection means arranges the volumes from best fit to worst fit to select the volume required that best matches the requirements of the data set for the most efficient use of the volume storage available. The best volume records are placed in a selected volume register means where they are transferred to a mass storage controller means for controlling the transfer of the data set information to the selected volumes, [Column 6, Lines 15-23]*).

Regarding **claim 19**, Clifton further discloses the data files are retrieved from the storage device by the application program directly via the computer network and without reference to the broker program (*The mass storage system responds to the program operating system of its host computers in the virtual direct access mode. That is, to the host computer, the mass storage system appears as a plurality of disk drives directly available to the host computer. The operating system of the host computer assigns a disk virtual volume to a system unit. When a virtual volume is mounted in the mass storage system, it is also assigned to a unit address. The virtual unit address is used to designate the logical address of each virtual volume and is used in staging data and in locating the data on a staging pack, [Column 2, Lines 52-58]*).

Regarding **claims 20, 46, and 71**, Clifton further discloses determining, by means of the broker program, the directory location for storage of the data file on the storage devices (*The selection process selects a storage volume according to the information describing the data set that is to be stored. The selection apparatus and process weighs the factors describing the data set and searches each virtual volume in a specific group for the best storage location for the data set under consideration, [Column 5, Lines 11-17]*).

Regarding **claim 21**, Clifton further discloses creating, by means of the broker program, the directory entry for the data file in the directory location in anticipation of data being written to the file by the application program requesting storage (*The best volume selection means arranges the volumes from best fit to worst fit to select the volume required that best matches the requirements of the data set for the most*

*efficient use of the volume storage available. The best volume records are placed in a selected volume register means where they are transferred to a mass storage controller means for controlling the transfer of the data set information to the selected volumes, [Column 6, Lines 15-23]).*

Regarding **claims 22, 47, and 72**, Clifton further discloses notifying, by means of the broker program, the directory location of the data file to the application program for storage by the application program (*The best volume selection means arranges the volumes from best fit to worst fit to select the volume required that best matches the requirements of the data set for the most efficient use of the volume storage available. The best volume records are placed in a selected volume register means where they are transferred to a mass storage controller means for controlling the transfer of the data set information to the selected volumes, [Column 6, Lines 15-23]).*

Regarding **claim 23**, Clifton further discloses the directory entry for the data file in the directory location is created by the application program prior to data being written by it (*The best volume selection means arranges the volumes from best fit to worst fit to select the volume required that best matches the requirements of the data set for the most efficient use of the volume storage available. The best volume records are placed in a selected volume register means where they are transferred to a mass storage controller means for controlling the transfer of the data set information to the selected volumes, [Column 6, Lines 15-23]).*

Regarding **claims 24, 48, and 73**, Clifton further discloses the state of the storage devices includes the current availability of such devices for data to be written thereto (*From the volumes remaining, an attempt will be made to select a volume that is not a job wait volume. If any volumes exist that are not a job wait volume, then one of these volumes will be selected*, [Column 29, Lines 60-64]).

Regarding **claims 25, 49, and 74**, Clifton further discloses the state of the storage devices includes the amount of free space available in the storage devices (*The SPACECK program calculates the free space on the volume taking into account the reserved space on each volume. A volume is rejected if there is not sufficient space in the volume and the process returns to look at the next volume*, [Column 27, Lines 10-18]).

Regarding **claim 53**, Clifton further discloses an Application Program Interface running on the one or more computers to pass commands to and from the broker program and the application program (*A special command is issued to interface with the storage system containing the virtual volume location. The request is placed on the storage volume control queue which in turn sends a request to a volume selection module where the actual selection process takes place*, ([Column 5, Lines 6-11]).

7. **Claims 3, 5, 11, 15-17, 31, 33, 39, 43-44, 56, 58, 61-64, and 68-69**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. (*Pat. No. US 4,310,883, published on January 12, 1982; hereinafter Clifton*), in view of Crocitti (*Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti*), and further in

view of Leonhardt (Pub. No. US 2002/0188592, filed on June 11, 2001; hereinafter Leonhardt).

Regarding **claims 3, 5, 31, 33, 56, and 58**, Clifton, as modified by Crocitti, does not explicitly disclose the selecting step comprises selecting in-use storage devices in preference to empty storage devices.

However, Leonhardt discloses the selecting step comprises selecting in-use storage devices in preference to empty storage devices (*if the data attributes as defined by storage management policy indicates that the data set is a candidate to reside on a tape cartridge, then a tape cartridge with expired data on it must be selected to write the data set to. The tape cartridge selected can be one which is completely void of data sets, or the tape cartridge could contain some data sets which have not yet expired and the space available on that tape cartridge can be used to write the current data, [0059]*).

It would have been obvious to a person skilled in the art at the time the invention was made to incorporate the teachings of Leonhardt with the teachings of Clifton, as modified by Crocitti, for the purpose of providing a management system which presents to host processors a virtual data storage image having a desired storage attribute for a particular data storage application by combining physical data storage devices in an arrangement suitable for providing the desired storage attribute ([0001] of Leonhardt).

Regarding **claims 11, 39, and 64**, Leonhardt further discloses after the data file has been written to the storage device, preventing the file from being modified or deleted until the expiry date has passed (*management software 42 further performs*

*data expiration processing. It is typical for data sets to have an inherent expiration date which defines a point in time at which the data contained in the data set is no longer valid. When data sets reach their expiration date, they will be deleted, [0060]).*

Regarding **claims 15, 43, and 68**, Leonhardt further discloses the characteristics of the data to be stored include the application program which requires its storage (*an outbound storage manager is operable with the plurality of physical data storage devices for presenting to the host processor a virtual data storage image having a desired data storage attribute for a particular data storage application, [0011]*).

Regarding **claims 16, 44, and 69**, Leonhardt further discloses the characteristics of the data to be stored include the size of the application data (*The attributes or storage policies of the individual data sets must be understood by outbound storage manager 10 in order to make intelligent decisions about placement and movement of the data sets. Some relevant data set attributes and policies include data set size, [0044]*).

Regarding **claim 17**, Leonhardt further discloses writing the application data to and/or reading the application data from the storage devices directly by means of the application programs via the computer network (*an outbound storage manager is operable with the plurality of physical data storage devices for presenting to the host processor a virtual data storage image having a desired data storage attribute for a particular data storage application, [0011]. See Figure 1 for the client/server structure*).

Regarding **claim 61**, Clifton further discloses storing for each of the storage devices a target expiry date, and selecting which of the storage devices to use in dependence on a comparison of the expiry date and the target expiry date (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]]*).

Regarding **claim 62**, Clifton further discloses preventing application data from being stored on a storage device, if the target expiry date for that storage device is earlier than the expiry date (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]]*).

Regarding **claim 63**, Clifton further discloses preventing application data from being stored on a storage device if the target expiry date for that storage device is

earlier than the expiry date by more than a predetermined margin (*each volume record from the group is checked one at a time to determine if the volumes are eligible to be selected for the current request according to the data set information. The comparators 42 check if the volume expires before the expiration date set for the data set, [Column 19, Lines 28-38]. The first decision is whether the volume is eligible to satisfy this request. If it is not eligible, the volume record is checked to see if it is the last volume in the group and, if not, the subsequent step is to get the next volume in this group and to examine that volume, [Column 24, Lines 27-34]).*

8. **Claims 13-14, 41-42, and 66-67,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. (Pat. No. US 4,310,883, published on January 12, 1982; hereinafter Clifton), in view of Crocitti (Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti), and further in view of McMurdie et al. (Pat. No. US 6,882,795, filed on October 30, 2000; hereinafter McMurdie).

Regarding **claims 13, 41, and 66**, Clifton, as modified by Crocitti, does not explicitly disclose the characteristics of the data to be stored include a classification of the content of the application data.

However, McMurdie discloses the characteristics of the data to be stored include a classification of the content of the application data (*once the client application 202 has been provided enumerated formats, a format has been selected as active, and the client application 202 has been provided the application format interface identifications, the disc master interface 222 then provides the client application 202 with an enumerator*

*that enumerates the recording devices 280 supported by the system, and presently connected to the system, [Column 5, Line 66 → Column 6, Line 5]).*

It would have been obvious to a person skilled in the art at the time the invention was made to incorporate the teachings of McMurdie with the teachings of Clifton, as modified by Crocitti, for the purpose of recording data with minimal data interruption, even with very large and complex audio and video files, by selecting recording devices based on the selected data format ([Column 3, Lines 50-55] of McMurdie).

Regarding **claims 14, 42, and 67**, McMurdie further discloses:

*storing for each of the storage devices, a target content type (As shown in Figure 3, in addition to the IRedbookDiscMaster 224 and the IJolietDiscMaster 226 described above, several additional application format interfaces are configured to the exemplary system. The application format interfaces illustrated include IIISO9660DiscMaster 227a for ISO9660-format data, IUUDFDiscMaster 227b for UDF-format data, ICDEExtraDiscMaster 227c for CD Extra-format data, IPhotoCDDiscMaster 227d for photographic data, ICD3DiscMaster 227e for audio data, IVideoCDDiscMaster 227f for video data, [Column 5, Lines 19-25]);*

*comparing the classification of the content of the application data and the target content type (The disc master interface 222 provides the client application 202, as represented through dashed line 210, an enumerator that enumerates the formats supported and provides identification of the application format interfaces present, [Column 47-51]); and*

preventing the application data from being stored in a storage device if the target content type for that device and the classification do not match (*The disc master 220 contains all of the application format interfaces that are supported by a system, [Column 5, Lines 1-2]*). *It is well inherent that for files with unsupported format, the files will not be stored in these devices.*

9. **Claims 26, 50, and 75**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. (*Pat. No. US 4,310,883, published on January 12, 1982; hereinafter Clifton*), in view of Crocitti (*Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti*), and further in view of Gotoh et al. (*Pub. No. US 2003/0079084, filed on March 28, 2002; hereinafter Gotoh*).

Regarding **claims 26, 50, and 75**, Clifton, as modified by Crocitti, does not explicitly disclose the state of the storage devices includes the rate at which data is being read from and/or written to such devices.

However, Gotoh discloses the state of the storage devices includes the rate at which data is being read from and/or written to such devices (*the storage control device 10 may be connected with a plurality of host processors 20. In this case, the response time upper limit value of each the files will be stored for each host processor, and storage device(s) to where the files are to be stored will be selected for each host processor 20, or, when there is an input/output request of a certain file from the host processor 20, the upper limit value of the file and the response time of each storage device will be compared and the processing priority of the relevant input/output request will be determined according to the comparison result, [0059]*).

It would have been obvious to a person skilled in the art at the time the invention was made to incorporate the teachings of Gotoh with the teachings of Clifton, as modified by Crocitti, for the purpose of providing a storage control device which stores and manages data sent from a host processor connected to communicate therewith, and optimizing a operational form of the storage control device ([0002] of Gotoh).

10. **Claims 27, 51, and 76**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. (*Pat. No. US 4,310,883, published on January 12, 1982; hereinafter Clifton*), in view of Crocitti (*Pub. No. US 2001/0006403, published on July 5, 2001; hereinafter Crocitti*), and further in view of Basham et al. (*Pub. No. US 2003/0050729, filed on September 10, 2001; hereinafter Basham*).

Regarding **claims 27, 57, and 76**, Clifton, as modified by Crocitti, does not explicitly disclose monitoring the status of the storage devices, detecting when new storage devices have been added, and making these available for storage.

However, Basham discloses monitoring the status of the storage devices, detecting when new storage devices have been added, and making these available for storage (*Figure 8 shows the process of adding a physical drive including the steps of making this physical drive ready and available for storage by configuring it for a storage library, [0066]*).

It would have been obvious to a person skilled in the art at the time the invention was made to incorporate the teachings of Basham with the teachings of Clifton, as modified by Crocitti, for the purpose of providing an automated data storage library which

stores portable data storage cartridges in storage shelves and transports the portable data storage cartridges between the storage shelves and the data storage drives for mounting and demounting the portable data storage cartridges at the data storage drives ([0002] of Basham).

***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Information***

12. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Son T. Hoang whose telephone number is (571) 270-1752. The Examiner can normally be reached on Monday – Friday (7:00 AM – 4:00 PM).

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Christian Chace can be reached on (571) 272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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